EETF Quarterly Progress Report

Grant # 7310029

Safe and Efficient Exhaust Thimble

Submitted by:

Grantee: Rorik A Peterson
University of Alaska, Fairbanks (UAF)
Institute of Northern Engineering (INE)

Period: April 1, 2013 – June 30, 2013 (Q2)

Summary

The project Budget/Milestone Schedule from the Grantee's original scope of work is shown below. No changes to this have been requested or made.

Milestone		Task	Start Date	End Date	Grant Funds	Match Funds	Total Budget	Deliverables
	1	Purchase and assembly of DAQ and instrumentation	Feb 2013	Feb 2013	$12,196		$12,196	DAQ system "dry-run" data set to ACEP for plan verification
	2	High fidelity performance test of 2-inch thimble	Mar 2013	Mar 2013	$11,193	$5793	$16,986	Performance test results
MS 1: AEA accepts performance test results								
	3	Design, construct and testing of 4, 6, 8, and 10-inch thimbles	Apr 2013	Oct 2013	$62,868		$62,868	Performance test results
	4	Draft project report	Nov 2013	Dec 2013	$816		$816	Draft project report
	5	Final project report	Dec 2013	Jan 2014	$816		$816	Final project report
MS 2: AEA accepts final report								
Total					$87889	$5793	$93,682	

Deliverables Submitted

No deliverables have been submitted to date. Task 1 and Task 2 deliverables are behind schedule according to the original time line.

Budget

Total funds expended to date are $4745.60 of the grant total $87,889.00 (~5%). Matching funds of $5793.00 have been expended during work on Task 2 during the recent reporting period. The project is currently running at 55% of projected budget in terms of percent completion of each task at this point.

Schedule Status

Task 1 and Task 2 are behind the original schedule. The entire project was delayed 3 months and did not commence until the beginning of June. The delay occurred because the testing location (UAF connex acquired as surplus from ACEP) was not vacated completely until the end of May. Today project testing is occurring in the connex and no further delays are foreseen.

Commencement of the longest duration task, Task 3, is also behind schedule. It is possible that the project can be brought back on schedule if this task progresses more smoothly than originally planned. However, if that does not occur, a no-cost extension would be required to complete the project. That request is NOT be made at this time.

Percent Complete

The estimated percent completion of the 5 project tasks is shown in the table below.

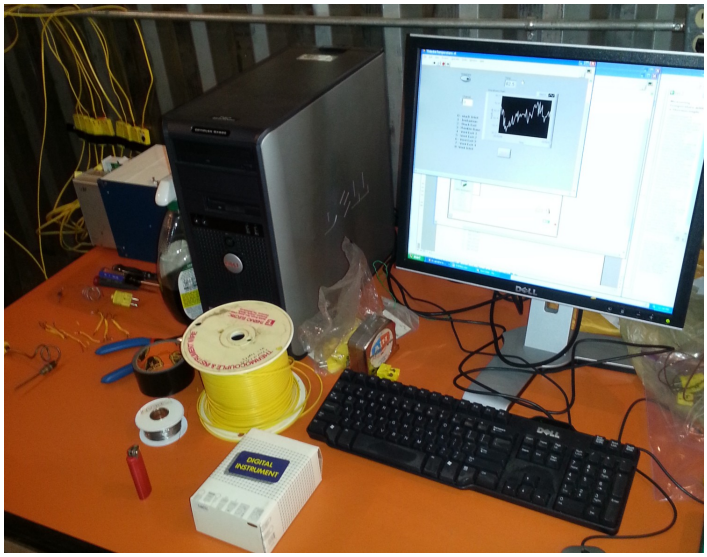
Task 1: 90%	Task 2: 50%	Task 3: 0%	Task 4: 0%	Task 5: 0%

Task 1, *Purchase and assembly of DAQ and instrumentation*, is complete however there may be some further purchases required in the case of instrument failure or if additional redundancy is required with future, larger thimble prototypes. The Task 1 deliverable is being held up waiting for confirmation of reproducible and automated anemometer data collection. It is anticipated that the automation issues with this will be worked out in the next few weeks. Tom Johnson (ACEP) has been involved and helpful with trouble-shooting some of the temperature measurement issues observed early in this task.

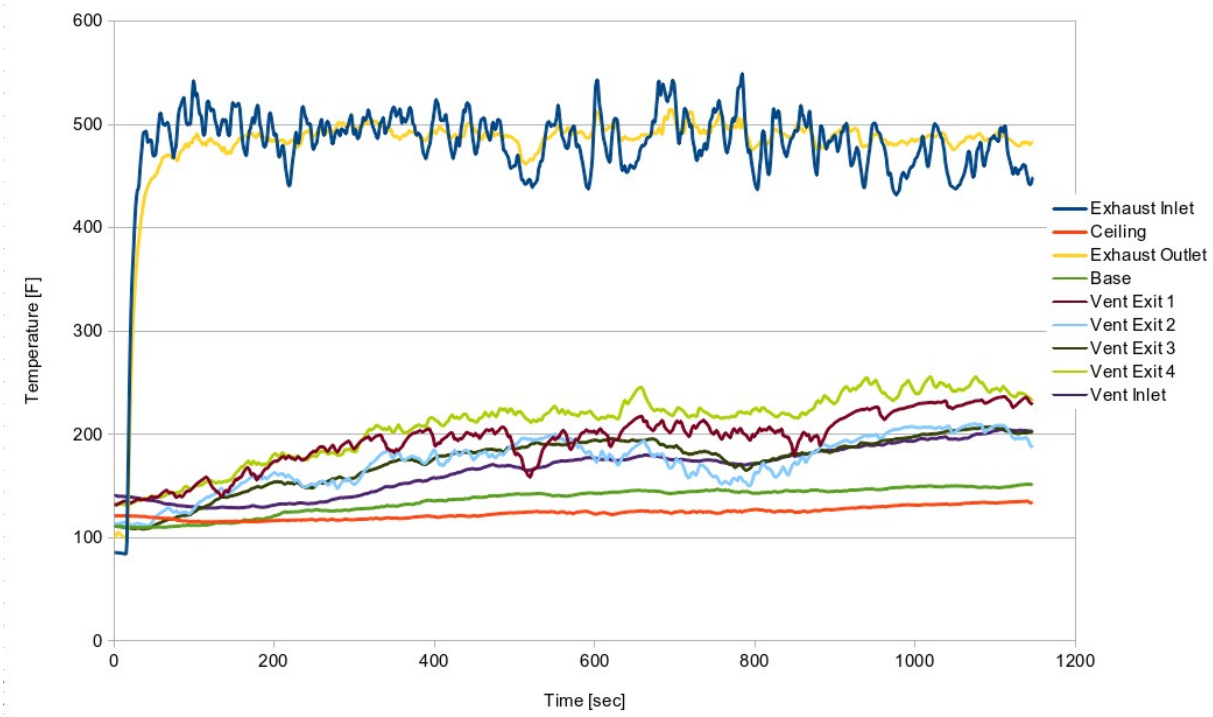
Task 2, *High fidelity performance test of thimble*, is about 50% complete. Reproducible temperature data are being collected from 9 different locations on the thimble, and 37 experiments has been conducted so far as part of this task. Integration and automation of the anemometer and IR temperature data collection is still required for completion of this task.

Work Progress

The experimental set-up has been successfully installed in a connex on the UAF campus, and is dedicated solely to this purpose. The picture below shown the instrumented thimble from both inside (left) and outside (right) the connex. Yellow wires are thermocouple extension wires that are multiplexed into the DAQ system. The picture on the next page shows the automated DAQ system which includes a PC computer and National Instruments SCXI hardware.



There have been 37 separate experiments conducted as part of Task 2. An example of temperature data from one experiment are shown in the figure below. Data are collected at a rate of 1 Hz from all locations and saved in a plain text file, as outlined in the data collection plan. The top lines (blue and yellow) are the hot exhaust temperatures, the middle 4 lines are the inlet and outlet to the thimble vent system, and the bottom two lines (red and green) are located on the thimble base itself and the adjacent ceiling. The variability in vent temperature and exhaust inlet is believed due to temporally unstable air flow, but that has yet to be confirmed as part of Task 2.



Future Work

The near-term future work, and expected outcomes, are the following in sequential order:

- Verify reproducibility of anemometer data collection. At that point, the Task 1 deliverable can be made.
- Complete one set (3 replicates) of data collection as outlined in the plan: temperature, flow rate, and IR data. At this point, the Task 2 deliverable can be made.
- Submit results of above testing to AEA for verification of meeting Milestone 1.
- Commence with Task 3 by initially constructing a 2-inch larger thimble.